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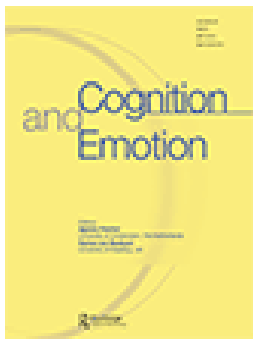
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BRIEF ARTICLE



Emotion differentiation and its relation with emotional well-being in adolescents

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ABSTRACT

Emotion differentiation (ED) refers to the precision with which people can identify and distinguish their emotions and has been associated with well-being in adults. This study investigated ED and its relation with emotional well-being (i.e. depressive symptoms, positivity and negativity intensity and propensity, implicit theories of emotions) in adolescents. We used an experience sampling method with 72 participants ($M_{\text{age}} = 14.00$, 71% girls) to assess adolescents' positive and negative emotions at different time points over the course of two weekends and a baseline questionnaire to assess emotional well-being. Differentiating negative emotions was related to less negativity intensity and propensity, and to the belief that emotions are malleable. Differentiating positive emotions was not related to any of the assessed well-being variables. Together, these results suggest that a detailed awareness of one's negative emotional states is an important dimension of well-being, also in adolescence.

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Emotion differentiation; adolescence; experience sampling method; positive emotions; negative emotions; emotional well-being

Emotions help us to navigate through our daily lives by providing an immediate and reflective answer to the questions “what am I feeling?”, “how am I doing?”, and “what do I want?” (Keltner & Gross, 1999). Individuals vary in the degree to which they differentiate their emotions, which has been labelled *emotion differentiation* (ED) or emotional granularity (Barrett, Gross, Christensen, & Benvenuto, 2001). Some people describe their emotional states in global terms (e.g. they feel *bad* after learning about a partner's infidelity), whereas others describe their emotional states in specific terms (e.g. they feel *angry* and *jealous* after learning about a partner's infidelity). So far, ED has been linked to well-being in adults only (see Kashdan, Barrett, & McKnight, 2015 for a review). Adolescence, a developmental period characterised by increased emotionality and mood swings (Rosenblum & Lewis, 2003) and a rise in emotional problems (Kessler,

Petukhova, Sampson, Zaslavsky, & Wittchen, 2012), was the focus of the current study.

Emotion differentiation and well-being

Being aware of one's emotional states and understanding them as distinct states enables people to react to situational demands adequately and regulate emotions effectively (Kuppens & Verduyn, 2015) as focusing and dampening specific emotions (e.g. anger or sadness) might be easier compared to global states (i.e. feeling bad; Barrett et al., 2001). In line with this, correlational studies showed that across individuals higher levels of negative ED are associated with better psychological adjustment (Boden, Thompson, Dizen, Berenbaum, & Baker, 2013; Erbas, Ceulemans, Lee Pe, Koval, & Kuppens, 2014; Grühn, Lumley, Diehl, & Labouvie-Vief, 2013;

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Kashdan, Ferssizidis, Collins, & Muraven, 2010). Specifically, with regard to emotional well-being, low negative ED was associated with more depressive symptoms in healthy adults (Erbas et al., 2014) and depressed adults experienced less differentiated emotions compared to healthy adults (Demiralp et al., 2012). Importantly, none of the studies has investigated the causal link between ED and various outcomes. Overall, results from these correlational studies suggest that negative ED is positively related to mental health.

Positive ED has received substantially less attention and results are inconsistent. Some studies showed a positive relation between positive ED and well-being (e.g. Boden et al., 2013; Selby et al., 2014; Tugade, Fredrickson, & Barrett, 2004), whereas other studies did not show any relation with well-being (e.g. Demiralp et al., 2012; Grühn et al., 2013) or emotion regulation (Barrett et al., 2001). Overall, these results suggest that positive ED may be beneficial but results are inconclusive.

The present study

The different results for negative and positive ED signal that it is necessary to further elucidate both forms of ED separately to receive a better picture for the importance of ED for well-being. Hence, in the current study we investigated the relation between positive and negative ED and emotional well-being in adolescents. In line with earlier studies, experience sampling method (ESM; Hektner, Schmidt, & Csikszentmihalyi, 2007) was used to assess emotions. To quantify an individual's degree of ED, intra-class correlations (ICCs) between different emotions across several time points were calculated for positive and negative emotions separately (Barrett et al., 2001; Lindquist & Barrett, 2008).

Consistent with earlier studies and because those constructs are particularly relevant for adolescents, we examined emotional intensity, depressive symptoms, and implicit theories of emotions. First, intense negative emotions have been related to mood disorders (see Larsen, 2009 for a review), whereas positive emotions were identified as protective factors in the development of psychopathology (Gilbert, 2012). Second, depressive symptoms increase in adolescence (Kessler et al., 2012) and are associated with future depressive episodes (Pine, Cohen, Cohen, & Brook, 1999). Both depressive symptoms and emotional intensity have been shown

to be related to ED in adults (e.g. Erbas et al., 2014; Grühn et al., 2013). Hence, we expected adolescents who are better at differentiating emotions to experience lower levels of negative emotions (intensity and propensity), higher levels of positive emotions (intensity and propensity), and lower levels of depressive symptoms. Third, implicit theories of emotions are based on Dweck's (1999) implicit theories of intelligence which state that individuals differ in the degree to which they believe that human attributes (e.g. intelligence, emotions) are malleable. Some people perceive emotions as malleable (incremental theorists), whereas others perceive them as fixed (entity theorists; Tamir, John, Srivastava, & Gross, 2007). Compared to incremental theorists, entity theorists show poorer psychological adjustment (De Castella et al., 2013; Dweck, 2012; Romero, Master, Paunesku, Dweck, & Gross, 2014; Schroder, Dawood, Yalch, Donnellan, & Moser, 2015; Tamir et al., 2007). Because ED and implicit theories of emotions share a mutual relation with well-being, we expected incremental theorists to show higher differentiation of emotions.

Method

Participants

One hundred and five participants were recruited from three secondary schools in high-risk neighbourhoods (e.g. low income and migration background) in the Netherlands; 98 adolescents (93.3%) agreed to participate and did not receive an objection from their parents (passive consent). Eleven adolescents did not participate in the ESM because they were either sick when the study took place or withdrew their willingness to participate ($N=87$). Our sample included pupils of the high or middle educational level only and the majority (79 participants, 90.8%) was of Dutch descent. We included only adolescents who filled out at least 25% of the ESM assessments ($N=86$, $M_{\text{age}}=13.94$, $SD_{\text{age}}=.96$ years, 65% girls). Fourteen of these adolescents did not fill out the baseline questionnaire and were excluded from all analyses including baseline measurements which resulted in a sample of 72 participants ($M_{\text{age}}=13.98$, $SD_{\text{age}}=.92$ years, 71% girls). No differences emerged from those who did not fill out the baseline questionnaire ($N=14$, $M_{\text{age}}=13.77$, $SD_{\text{age}}=1.17$ years old, 36% girls) with regard to age $t(83)=.72$, $p=.48$, 95% CI of difference

[−.78, .37]. Included adolescents were, however, more likely to be girls $\chi^2(1) = 6.36, p = .01$. Adolescents participated voluntarily and received a voucher of 20€ for their participation. All procedures were approved by the Ethical Committee of the Faculty of Social Sciences (ECG2012-2606-042).

Procedure and measures

Study setting

This study was part of a randomised controlled trial investigating the effectiveness of the Dutch depression prevention programme “Op Volle Kracht” (OVK) which was adapted from the Penn Resiliency Program (Gillham et al., 2007). In the larger study, half of the adolescents followed a depression prevention programme for six months and the other half followed the regular school curriculum (for a full description of the procedure see Kindt, van Zundert, & Engels, 2012). OVK was not effective at reducing depressive symptoms over a one-year period (Kindt, Kleinjan, Janssens, & Scholte, 2014).¹ The current study used a subsample of adolescents participating in that larger study and was conducted after the intervention had been completed. Only adolescents from schools who agreed to participate in the second part of the research were eligible to participate. To examine whether any differences on the key variables of this study emerged between the intervention and the control group, we compared means of all study variables using *t*-tests and did not find any differences.² Further, regression analyses were performed with and without including intervention as a covariate. Results remained the same and thus all results presented do not include condition as a covariate.³ The current study consisted of two parts: ESM and a baseline questionnaire.

Experience sampling method (ESM)

Participants filled out the ESM on two weekends that were scheduled six weeks apart to reduce burden for participants by not having to respond to a buzzing smartphone two weekends in a row. On Fridays, participants received smartphones with an application that emitted buzzing signals at random times within 90-minute intervals. They received instructions regarding the use of the smartphones, how to fill out the questionnaires (i.e. stopping their current activity immediately) and explanations of the items. Participants also indicated times that they would not be able to answer the phone (e.g. sports

training and music lessons). Each weekend participants received 22 buzzing signals (four on Friday between 4.30 p.m. and 10.30 p.m., and nine on each Saturday and Sunday between 9.00 a.m. and 10.30 p.m.). Completing the questionnaire took approximately six minutes. When participants did not respond to the first signal they were reminded a maximum of two times within six minutes after which it was no longer possible to complete the questionnaire for that assessment.

Emotional intensity

Positivity intensity was assessed with five items: happy, cheerful, satisfied, relaxed, and proud. Negativity intensity was assessed with nine items: jealous, anxious, ashamed, irritated, worried, angry, guilty, sad, and lonely. These items were selected from the Positive and Negative Affect Scale (Watson, Clark, & Tellegen, 1988) and other ESM studies (Wichers et al., 2007). Adolescents indicated the extent to which they felt each described emotion just prior to the assessment on a 7-point scale that ranged from (1) *not at all* to (7) *very much*.

Other measures

The questionnaire also assessed other variables that are not reported upon in the current manuscript. These included adolescents' current activity, where they were, with whom they were and how they felt in that company, and whether they compared themselves to others. Further, we assessed what the most negative event was that they experienced since the last assessment, which negative emotions they felt during the event, how they regulated these emotions, and also the most positive event they experienced since the last assessment.

Baseline questionnaire

One to three months before the ESM assessments, participants completed a baseline questionnaire on a computer at home that assessed levels of positivity and negativity propensity, depressive symptoms, and implicit theories of emotions.

Emotional propensity

Positivity and negativity propensity (Lennarz, Lichtwarck-Aschoff, Finkenauer, & Granic, 2017) were assessed with the same items as positivity and negativity intensity. Adolescents indicated the extent to which they felt each of the cues during the past 2 weeks on a 7-point scale that ranged from (1) *not at*

all to (7) *very much*. The reliability of positivity and negativity propensity was good, $\alpha = .77$ and $\alpha = .83$, respectively.

Depressive symptoms

Twenty-six of 27 items of the Children's Depression Inventory (Kovacs, 1985) were used to assess symptoms of depression: the item about suicidal thoughts was omitted due to ethical concerns. Mean scores were computed for each participant and a higher score indicated more depressive symptoms. The reliability of the questionnaire was satisfactory, $\alpha = .77$.

Implicit theories of emotions

Beliefs about the malleability of emotions were measured with the four-item Theory of Emotions Scale (Tamir et al., 2007). Two items measured the entity dimension (thinking of emotions as being fixed) and two items measured the incremental dimension (thinking of emotions as being malleable). Adolescents indicated on a 5-point Likert scale (1) *strongly agree* to (5) *strongly disagree* how much they agreed with each statement. The two entity items were reversed and a mean score across all items was calculated. Higher scores indicated believing in the malleability of emotions. The reliability of the questionnaire was satisfactory, $\alpha = .68$.

Data analysis

ED was indicated via the ICCs separately for positive and negative emotions. As the ED measure we used the reversed ICC, denoted as $ICC-r = -1 \times ICC$; a higher ICC-r reflects higher ED. To investigate the strength of the ordinal relations between ED and emotional well-being, we computed Spearman rank order correlations⁴ of ICC-r with negativity and positivity intensity and propensity, depressive symptoms, and implicit theories of emotions.

Results

Descriptive statistics

Table 1 shows summary statistics for all variables included. In general, adolescents had relatively low negative emotional intensity and propensity and depressive symptoms, and relatively high positive emotional intensity and propensity. The average ICC-r for negative emotions was $-.59$ ($SD = 0.27$), with $-.91$ and $-.24$ as the 10th and 90th percentiles,

respectively. The average ICC-r for positive emotions was $-.63$ ($SD = 0.26$), with $-.87$ and $-.19$ as the 10th and 90th percentiles, respectively. Independent samples *t*-tests revealed no sex differences for negative ED $t(84) = 1.61$, $p = .11$, (boys $M = -0.54$, $SD = 0.29$; girls $M = -0.64$, $SD = 0.25$) but indicated sex differences for positive ED $t(48.35)^5 = 2.35$, $p = .02$. Boys ($M = -0.54$, $SD = 0.29$) were significantly better in differentiating positive emotions than girls ($M = -0.69$, $SD = 0.23$). Therefore, we controlled for sex in analyses including positive ED.

Emotion differentiation and emotional well-being

Spearman rank order correlation coefficients are presented in Table 1. Negative and positive ED were positively related. Further, as hypothesised, the negative ICC-r was negatively related to negativity intensity and negativity propensity, and implicit theories of emotions. After including sex as a covariate in a regression analysis, the positive ICC-r was not related to any of the well-being variables, $F(7,64) = 1.84$, $p = .09$.

Discussion

This study investigated ED in adolescence, a time of increased emotionality and mood swings (Rosenblum & Lewis, 2003), and increased risk of onset of emotional problems (Kessler et al., 2012). ED was positively related to well-being in adolescents: more negative ED was related to less intense negative emotions and to a higher belief in the malleability of emotions. Positive ED was not related to emotional well-being.

In line with the idea that negative ED is positive, most of our hypotheses were confirmed. First, corresponding to findings among adults (Boden et al., 2013; Erbas et al., 2014), adolescents who were better able to differentiate negative emotions, experienced less intense negative emotions. Although causality cannot be inferred with the current study design it may be that less intense negative emotions are more easily differentiated, whereas high intensity negative emotions create a feeling of being overwhelmed which may reduce the ability to differentiate (Barrett et al., 2001; Kuppens & Verduyn, 2015). Second, implicit theories of emotions and ED were positively related. Again, the directionality of this association needs further investigation. On the one hand, the ability to differentiate emotions may create a feeling of being in control of one's emotions because specific

Table 1. Emotion differentiation and well-being. Presentation of means, standard deviations, and Spearman rank order correlation coefficients between study variables.

	<i>N</i>	<i>M</i>	<i>SD</i>	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Negative ICC-r	86	−0.61	0.27									
2. Positive ICC-r	86	−0.64	0.26	.23*								
3. NE intensity	86	1.66	0.66	−.55**	−.16							
4. PE intensity	86	4.31	1.03	.09	.29**	−.41**						
5. NE propensity	72	2.51	1.06	−.23†	−.12	.42**	−.14					
6. PE propensity	72	5.12	1.13	.16	.08	−.25*	.43**	−.28*				
7. Implicit theories of emotions	72	3.18	0.84	.24*	.07	−.34**	.16	−.25*	.16			
8. Depressive symptoms	72	0.35	0.21	−.09	−.15	.30*	−.29*	.42**	−.50**	−.24*		
9. Sex	86	0.65	0.48	−.14	−.28*	.05	−.06	.14	−.09	−.10	.10	

Note: PE, positive emotion; NE, negative emotion.

** $p < .001$, * $p < .01$, † $p = .05$.

emotions are less overwhelming than global negative emotional states (Barrett et al., 2001). On the other hand, believing that emotions are malleable may help to pay closer attention to the emotions because one believes one can influence the emotions. This closer attention may enable individuals to identify the different emotions and contribute to ED.

Importantly, the direction of the relation between ED and well-being is not clear and more research is needed to disentangle the link. Causality could be investigated in the laboratory by priming participant with low/high intense negative emotions after which they have to differentiate emotions following Erbas et al.'s (2014) procedure for assessing ED in a laboratory or with longitudinal studies assessing ED and emotional well-being at different time points across a longer study period (e.g. 6 times in 2 years). These findings would provide information about whether the ability to differentiate emotions influences well-being or whether well-being influences the ability to differentiate emotions.

We did not find any relations with regard to positive ED. These null findings are consistent with studies among that suggest that negative ED is more important for well-being than positive ED (Demiralp et al., 2012; Erbas et al., 2014; Grünh et al., 2013; Kashdan et al., 2010). Negative ED may be more important because discrete negative emotions are easier regulated (Kuppens & Verduyn, 2015) and successful emotion regulation is associated with higher well-being (Gross & Thompson, 2007). An important note is that we assessed fewer positive emotions than negative emotions, which may have led to less variability, and hence reduced power to detect relations.

The relation between positive ED and negative ED was moderately positive. This finding is consistent with two previous studies among healthy adults

(Selby et al., 2014; Vandercammen, Hofmans, & Theuns, 2014). Hence, positive and negative ED may complement each other and the propensity for differentiation reflects a more general awareness and skill for labelling emotional states, regardless of valence.

This study has a few limitations. First, this study was part of a larger study investigating the effect of a depression prevention programme, based on cognitive-behavioral theory. Even though no differences emerged between the intervention and the control group in the current study and also the original trial failed to identify any differences between the groups on a large set of variables (Kindt et al., 2014), we cannot rule out the possibility that the prevention programme affected variables that are related to emotion regulation and emotional well-being but were not assessed in this or the original trial. Hence, these results need to be replicated in a non-prevention sample before firm conclusions can be drawn. Second, because of its correlational design, this study could not investigate direction of effects. Third, the sample size was relatively small. The results obtained from this sample were largely in line with our expectations but some of the expected relations failed to reach significance. To confirm the relations found here and to investigate ED in adolescents in more detail, replications with larger and more diverse samples (e.g. depressed versus healthy adolescents) are needed. Fourth, levels of negative emotions in this sample were relatively low and research among adults has shown strongest effects of ED in response to intense negative events (Barrett et al., 2001; Kashdan et al., 2010). Thus, our study might not have captured (enough of) the high intensity negative events in which individual differences in ED become salient. Future research should measure adolescents' emotions in highly negative situations, for example by experimentally inducing emotions in a laboratory.

Concluding, negative ED seems to be an important facet of emotional well-being in adolescents, as it relates to less intense negative emotions and a higher belief in the malleability of emotions. ED might thus be an important skill to promote in adolescence to prevent emotional problems.

Notes

1. Kindt et al. (2014) found a moderating effect of parental psychopathology for the effectiveness of the programme. In our sample we did not find significant differences between adolescents from parents with and without psychopathology $F(9,61) = .56, p = .82$. Hence, we did not control for parental psychopathology in our final analyses.
2. No differences emerged between the intervention and the control group on any of the variables of interest (all $ps > .05$): Age, $t(83) = .19, p = .85$, Sex $t(84) = .41, p = .68$, negativity propensity $t(70) = .82, p = .42$, positivity propensity $t(70) = .48, p = .63$, depressive symptoms $t(70) = 1.27, p = .21$, implicit theories of emotions $t(70) = .36, p = .72$, positivity intensity $t(70) = .07, p = .95$, negativity intensity $t(70) = .46, p = .65$, positive ICC, $t(70) = 1.43, p = .16$, negative ICC $t(70) = .68, p = .50$.
3. We ran four different regression models (separately for positive and negative ICC-r) to test whether condition influenced the results. Negative ICC-r was significantly related to theories of emotions $b = .23, t(70) = 2.01, p = .048$, and negativity intensity $b = -.37, t(70) = 2.84, p = .006, F(6,71) = 3.73, p = .003$ when not including condition as a covariate as well as when including condition as a covariate; theories of emotions $b = .24, t(70) = 2.01, p = .04$, and negativity intensity $b = -.37, t(70) = 2.87, p = .006, F(7,71) = 3.32, p = .004$. Positive ICC-r was not significantly related to any of the variables, neither when not including condition as a covariate $F(6,71) = .97, p = .45$ nor when including it $F(7,71) = .90, p = .51$.
4. A Pearson correlation would not be appropriate as there is no reason why the pairs of variables at hand would bear a linear relationship.
5. Degrees of freedom have decimal points if equal variances are not assumed.

Disclosure statement

No potential conflict of interest was reported by the authors.

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